Isles of Scilly Sea Defences - St Agnes

Biodiversity Net Gain Assessment
Final Report

May 2023

Prepared for:

Council of Isles of Scilly

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Contract

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This report describes work commissioned by the Council of the Isles of Scilly. Jonathan Harrison and Hannah Webster of JBA Consulting carried out this work.

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The methodology adopted and the sources of information used by JBA in providing its services are outlined in this Report. The work described in this Report was undertaken between May 2021 and May 2023 and is based on the conditions encountered and the information available during the said period. The scope of this Report and the services are accordingly factually limited by these circumstances.

Where field investigations are carried out, these have been restricted to a level of detail required to meet the stated objectives of the services. The results of any measurements taken may vary spatially or with time and further confirmatory measurements should be made after any significant delay in issuing this Report.

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Abbreviations

BNG	Biodiversity Net Gain
INNS	Invasive Non-Native Species
MCZ	Marine Conservation Zone
SAC	Special Areas of Conservation
SPA	Special Protection Area
SSSI	Sites of Special Scientific Interest

1 Introduction

1.1 Project Background

The Council of the Isles of Scilly is proposing to construct new coastal and flood protection works at nine sites across the islands off of the Isles of Scilly. Three of these sites, Porth Killier, Porth Coose and Periglis Beach are located on the island of St Agnes.

The Isles of Scilly are generally low lying and therefore many areas are vulnerable to flooding. The flood risk is likely to increase in the future as a result of the effects of climate change. The risks to the islands have been highlighted by storms in 1989, 2004 and 2014.

The aim of this project is to protect homes and businesses across the island of Bryher, St Agnes and St Martin's, as well as key infrastructure including the islands emergency services and road network.

This report outlines the results of a Biodiversity Net Gain (BNG) assessment carried out at the three sites on the island of St Agnes, Porth Killier, Porth Coose and Periglis Beach. It also highlights other opportunities for ecological enhancement within the scheme boundary and surrounding areas.

1.2 Site Location

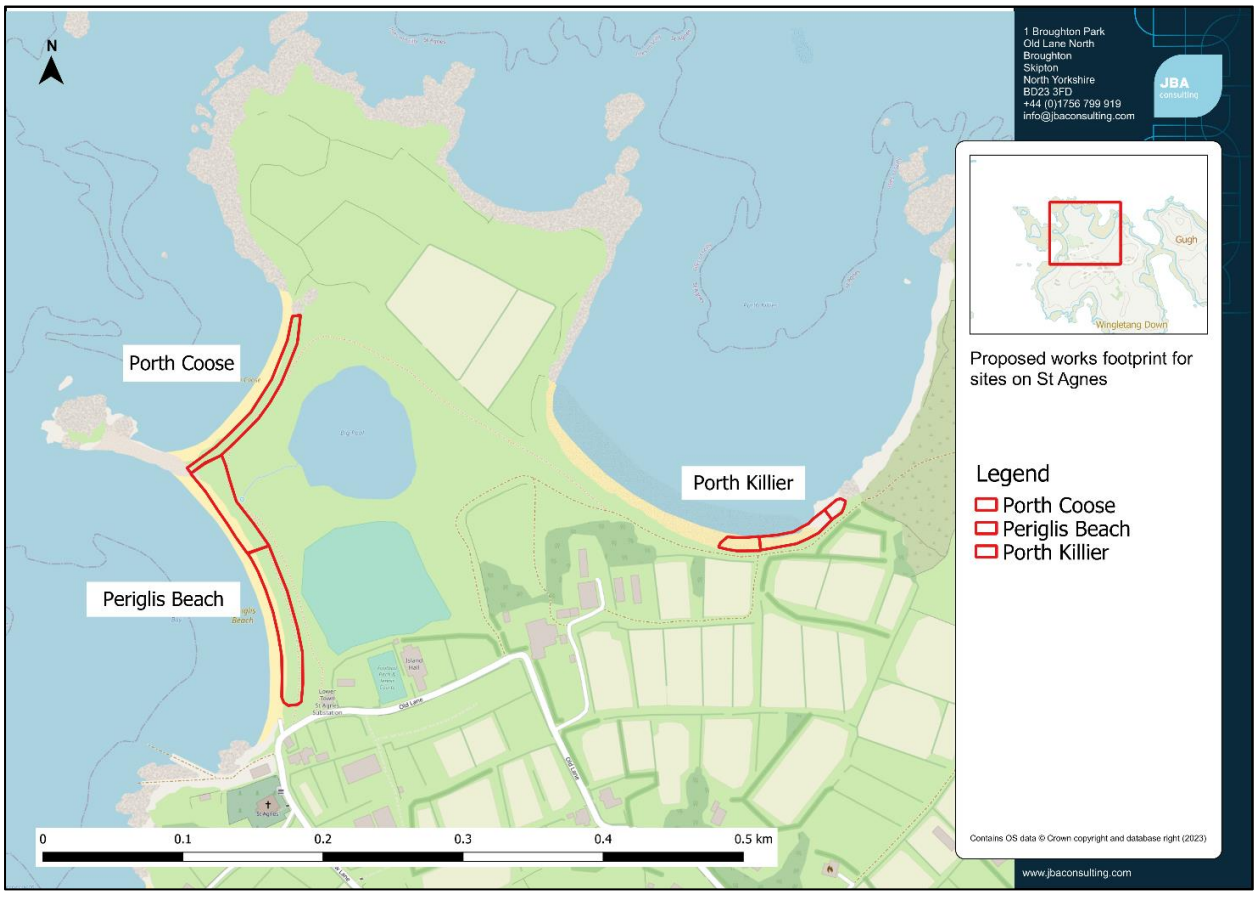


Figure 1-1. Works footprint boundary for each St Agnes site.

1.3 Proposed Works

1.3.1 Porth Killier

Coastal erosion and flood risk at Porth Killier presents a risk of inundation and contamination at the Big Pool, along with a risk of undermining the road that runs along the southern extent of Porth Killier and residential and non-residential properties and infrastructure in the vicinity.

The Porth Killier site has been divided into three areas of intervention: the sea wall; the eastern end; and the western end. Overtopping has not occurred at the western end and therefore no works are proposed there. The proposed works for the sea wall and the eastern end are outlined below.

The seawall:

- Implementation of a rock scour protection at the foundation of the seawall. Wider toe protection of 1 to 3 tonne rock size with a minimum width of 3m is recommended to protect the wall from undermining and failure, and also to reduce overtopping.
- A 30m section of the eastern side of the wall has been identified as the most damaged and as such, a 3m toe-berm of 1 to 3 tonne rock armour is proposed here. In some locations where damage is more severe, local repairs may be required prior to placing the rocks.
- A 35m section on the western side has been identified as the least damaged and as such, the rock toe here will be characterised by 1.9m wide 1 to 3 tonne rocks and 1.1m of cobbles, which will tie into the existing rock headland.
- Rock material will be sourced locally where possible but will need to be imported if unavailable.

Eastern end:

- Construction of a rock structure revetment with 1 to 3 tonne material to reduce ram erosion. The rock revetment would be placed up to the crest of the underside of the ram/outcrop to reduce the cut back towards the road. In order to minimise the volume of rock required, rock armour will be protected by a cobble toe that will make use of existing materials.
- The presence of the revetment will improve the stability of the ram and also act as a reduction to wave overtopping events.

1.3.2 Porth Coose

Porth Coose provides protection to Big Pool, important freshwater habitat, wells, aquifers and local infrastructure. Defences have historically been severely overtopped and as such enhanced defences are required. The proposed works include:

- Provision of a more robust and wider ridge crest along the entire length of the Porth Coose. The crest elevation would be increased through recharge using

local and imported material, with rock bags at the rear filled with site won material to grade to existing levels.

- The bags will be placed on a prepared geotextile surface at the top of the slopes and fill material is to be placed behind to tie in the top of the bags to the ground behind. A geomat will be placed to stabilise this slope and encourage establishment of vegetation.
- The crest elevation will be increased to prevent overtopping and should be at approximately +7.3m.

1.3.3 Periglis Beach

Defences at Periglis provide protection for residential and non-residential properties, infrastructure and Big Pool. As such, there is a need to increase these defences which suffer from frequent erosion. The proposed works include:

- Protection of Periglis beach through use of geobags constructed into the rear of the dune ridge (3m landward), laid on a geomat and wrapped in geotextile, and covered with excavated cobble/sand material along most of the bay. The geobags will be filled with dry sand of density around 1600kg/m3. If sand material is not available, the geobags may be filled with graded local or imported rocks using high performance nets.
- Crest elevations will be raised to approximately +7.5m, and crest widths increased to reach a minimum of 4m to prevent overtopping. In order to achieve this increase in elevation, the existing dune/bank will be topped up and covered using local materials with biodegradable matting to retain the material whilst the grasses and plants establish. The natural plant fibres will provide a system of erosion control of the material positioned over the top of the dune/bank, while local flora gets naturally established. A local source of recharge sediment will be used for the dunes/banks. If no local material is available, filling material will be imported, possibly from quarries in Cornwall.
- The slipway already has a stop log fitting and stop logs and therefore no further action is required.

This approach will enhance the dune/ bank stability and will provide a robust and permanent approach in terms of protection from coastal erosion.

1.4 Biodiversity Net Gain (BNG)

Biodiversity Net Gain (BNG) is an approach that quantitatively accounts for biodiversity losses and gains on a site, with an aim for developments to leave the natural environment in a measurably better state than before.

The key mandatory legal principles of BNG are presented in the Environment Act 2021, which received Royal Assent in November 2021. These are:

- To deliver at least 10% gain required calculated using the Biodiversity Metric and approval of a biodiversity gain plan;

- Habitat secured for at least 30 years via planning obligations or conservation covenants;
- Delivered on-site, off-site or via a new statutory biodiversity credits scheme; and
- National register for net gain delivery sites.

Whilst the Environment Act is not yet legally binding, quantification of BNG has been undertaken in accordance with policies contained within the Isles of Scilly Local Plan 2015-2030.

Policy OE1 Protecting and Enhancing the Landscape and Seascape states that 'biodiversity net gains will be required in addition to any mitigation and compensation measures across the islands to enhance the environment in line with t he objectives of DEFRA's 25 Year Plan: A Green Future (2018), A Natural Choice for Securing the Value of Nature (2011) and the NPPF. Net gains will be measured against the metrics published by DEFRA. As part of this commitment to net-gains, regard will be given to the implications of a changing climate, to ensure that habitats are protected and enhanced to support their resilience to such changes.

DEFRA Metric 4.0 has therefore been used to quantify loss of priority habitat. All impacts on the natural environment have been addressed sequentially in accordance with the principle of the mitigation hierarchy.

2 Methods

2.1 Habitats

Habitat areas within the site were assessed via a UKHabs survey carried out by ecologist Jonathan Harrison of JBA. The survey was used to obtain the most appropriate habitat type, condition score and ecological connectivity for each area of habitat. Habitat areas were estimated in hectares (ha) from overhead mapping using QGIS software. Strategic significance is also classified for each habitat area based on whether the area is included in a local plan or strategy.

This information is then fed into the Biodiversity Metric 4.0 to produce a total number of habitat area units currently present within the site. This provides the on-site baseline information.

For the post-works assessment, the proposed works information and habitat modelling was used to predict what habitats would be lost as a result of the scheme and the potential for additional habitat enhancement and creation measures to optimise net gain.

In undertaking this assessment, the Biodiversity Net Gain best practice guidelines (Baker et al., 2019) and principles (Baker et al., 2016) have been followed.

3 Baseline Assessment

3.1 Important Ecological Features

A summary of important ecological features within 1km of the proposed scheme is provided in Table 3-1 below and Statutory Designated sites within 1km of the proposed scheme are mapped in Figures 3-1 and 3-2.

Table 3-1. Important ecological features within 1km of the proposed scheme

Important Ecological Features	
Statutory Designated Sites	
Isles of Scilly Special Protection Area (SPA)	Within scheme boundary
Isles of Scilly Ramsar	Within scheme boundary
Isles of Scilly Special Area of Conservation (SAC)	50m from scheme boundary
Smith Sound Tide Swept Channel Marine Conservation Zone (MCZ)	200m from scheme boundary
Plympton to Spanish Ledge MCZ	800m from scheme boundary
Big Pool and Browarth Point Site of Special Scientific Interest (SSSI)	Within scheme boundary
Wingletang Down SSSI	600m from scheme boundary
Gugh SSSI	500m from scheme boundary

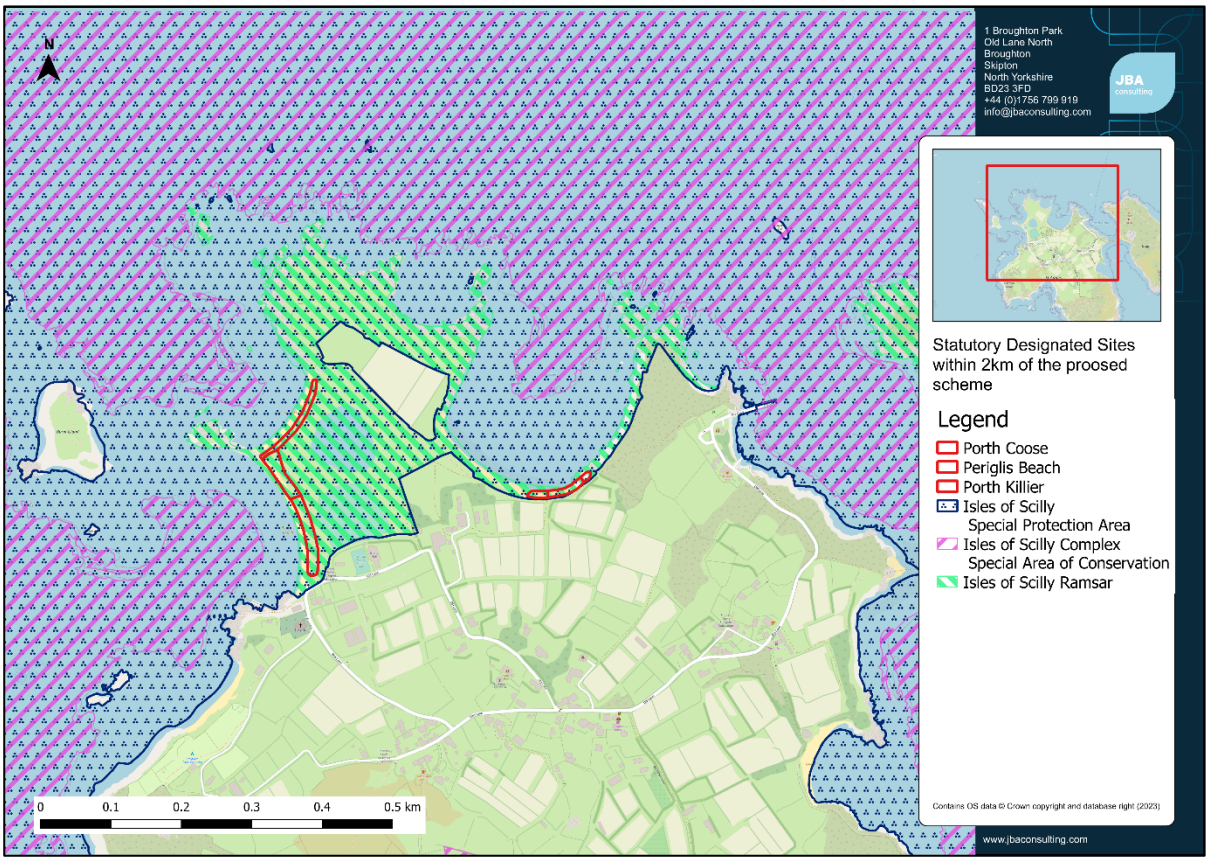


Figure 3-1. Special Protection Areas, Special Conservation Areas and Ramsar Sites within 1km of the proposed scheme.

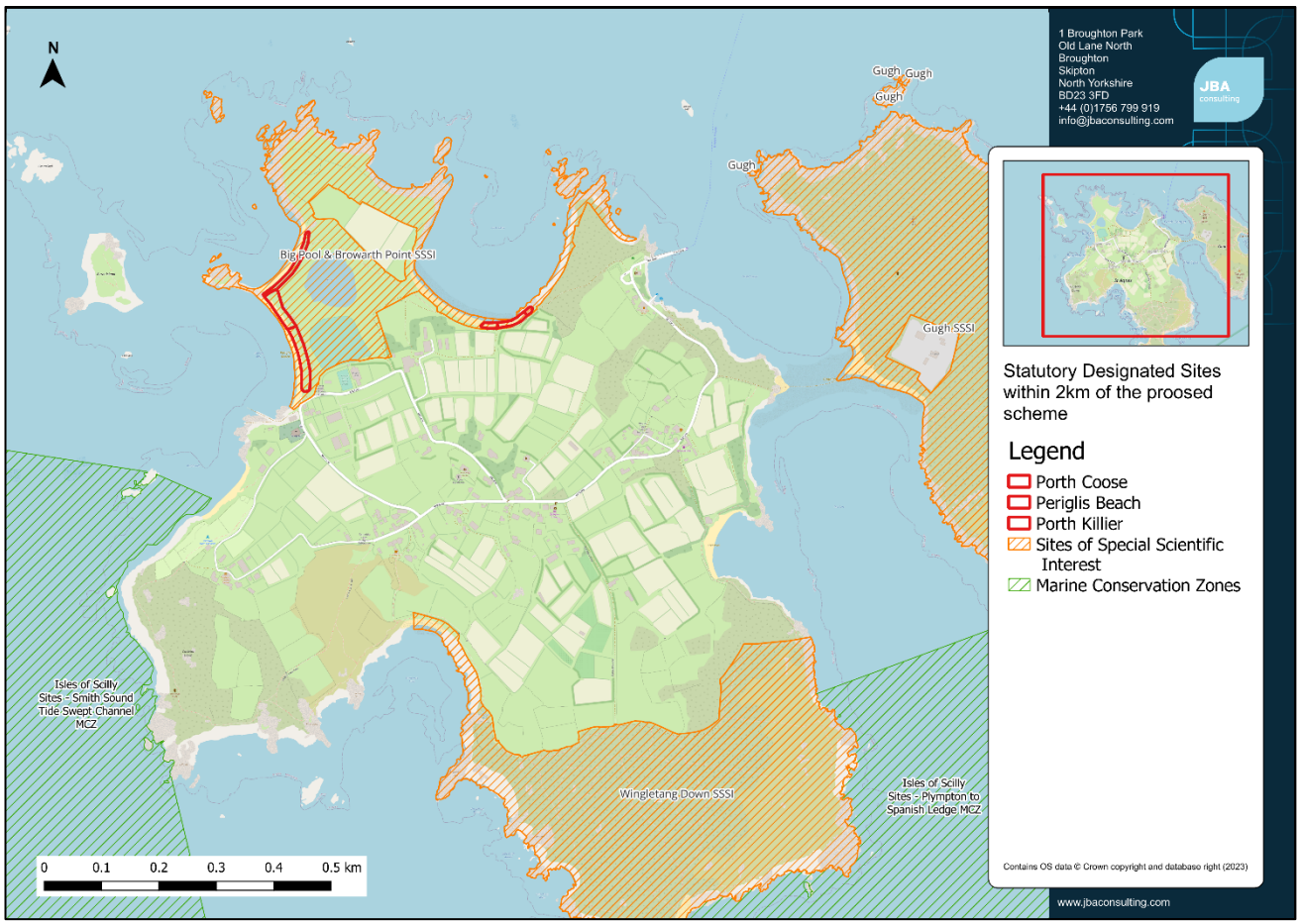


Figure 3-2. Marine Conservation Zones and Sites of Special Scientific Interest within 1km of the proposed scheme.

3.2 Baseline Habitats

The Baseline Habitats recorded at each site are described below. The total area of each habitat and the condition of each habitat is outlined in Table 3-2.

3.2.1 Porth Coose

3.2.1.1 Coastal Sand Dunes

Within the scheme boundary at Porth Coose to the south there is a narrow band of dune habitat present. At the top of the dune the habitat is indicative of fore dune or yellow dune habitat with a predominantly open plant cover. Marram grass *Ammophila arenaria* dominates with Sea beet *Beta vulgaris* also common.

3.2.1.2 Maritime Cliff and Slopes

On the seaward side of the sand dune ridge the eroding sand face has covered the existing concrete mattress and has been colonised by plants such as Sea Beet, Sea Kale, Sea Pea and Sea Mayweed. This eroding face is markedly different from the rest of the sand dune but should be classified as part of the sand dune system, however, as the biodiversity

metric does not have the detail required to classify this habitat we have classified it as Maritime Slope habitat as the species composition is similar to hard cliffs that are subject to wind-blown sand intrusion. .

3.2.1.3 Introduced Shrub

At the western extent of the scheme there is a small area of introduced shrub where the invasive non-native Hottentot Fig *Carpobrotus edulis* is dominant.

3.2.1.4 Built Linear Feature

Running through the centre of the scheme is a narrow band of ad-hoc rock armour and sea wall. This has been classified as the habitat Built Linear Feature.

3.2.2 Periglis Beach

3.2.2.1 Coastal Sand Dunes

Within the scheme boundary at Periglis Beach to the south there is a narrow band of dune habitat present. The habitat is indicative of fore dune or yellow dune habitat with a predominantly open plant cover. Marram grass *Ammophila arenaria* dominates with Sand Couch *Elytrigia juncea* and Sand Sedge *Carex arenaria* also common.

3.2.2.2 Bare Ground

Running though the area of dune habitat present within the scheme boundary is a footpath that consists of Bare Ground.

3.2.2.3 Maritime Cliff and Slopes

At the front of the scheme boundary as the area slopes down to the beach the eroding face of the dune is similar to that found at Porth Coose. This area consists of the sand face mixed with cobbles from the beach and areas of protruding geotextile from the previous works at the site. Again given the composition of maritime plant species that have established it has been decided that in the metric this will be classified as maritime cliff and slope in order to differentiate it from the sand dune ridge above.

3.2.2.4 Built Linear Feature

In some areas of the slope at the north of the scheme the habitats are being eroded. In these areas the geotextile has become exposed and these areas are devoid of vegetation.

3.2.3 Porth Killier

Due to the Biodiversity Metric 4.0 not accounting for the coastal habitats present at Porth Killier these habitats have not been included in the baseline for the proposed scheme but have been listed in the Irreplaceable Habitats tab within the metric.

3.2.3.1 Supralittoral Rock

The majority of the proposed site at Porth Killier is made up of Boulders and Cobbles above the high tide mark. As this habitat is not specified within the BNG Metric 4.0 this habitat has not been included in baseline habitats within the metric. The total area of this habitat is 0.07ha.

3.2.3.2 Moderate Energy Littoral Rock

To the east of the scheme there is an area of bedrock. This habitat has been classified as Moderate Energy Littoral Rock in moderate condition. As this habitat is not accurately represented within the BNG Metric 4.0 this habitat has not been included in baseline habitats within the metric. The total area of this habitat is 0.02ha.

Table 3-2. Habitat Area - Baseline Metric Summary

Habitat Type	Habitat Area (Ha)	Condition	Habitat Units
Porth Coose			
Coastal Sand Dunes	0.063	Poor	0.43
Maritime Cliff and Slopes	0.041	Poor	0.28
Introduced Shrub	0.006	n/a	0.01
Built Linear Feature	0.025	n/a	0
Total Area	*0.135*	*Total Units*	*0.72*
Periglis Beach			
Coastal Sand Dunes	0.220	Poor	1.52
Maritime Cliff and Slopes	0.055	Poor	0.38
Bare Ground	0.013	Poor	0.03
Built Linear Feature	0.004	n/a	0
Total Area	*0.292*	*Total Units*	*1.93*
Scheme Total Area	**0.427**	**Scheme Total Baseline Units**	**2.66**

4 Post Works Assessment

4.1 Habitat Losses and Enhancement

4.1.1 Porth Coose

At Porth Coose habitats present will either be retained or enhanced as part of the proposed scheme. The Maritime Cliff and Slope habitat present at the north of the scheme may be subject to temporary disturbance as part of the proposed works however the habitat will be reinstated to its current condition following the works.

The Coastal Dune habitat at the south of the scheme will also be subject to temporary disturbance as part of the proposed works however the habitat will be reinstated and enhanced after the works are complete. Whilst the coastal dune habitat will be enhanced as part of the scheme, due to the location of the dunes and the nature of the site this enhancement will not result in a change in condition. Therefore, the coastal dune habitat will remain at Poor condition.

The only permanent habitat loss at Porth Coose will be the loss of introduced shrub at the east of the scheme. This habitat will be replaced with Coastal Sand Dune.

4.1.2 Periglis Beach

At Periglis Beach permanent habitat loss will be limited the loss of the Bare Ground habitat in the form of the footpath at the south of the scheme. This 0.9 replaced with Coastal Sand Dune habitat.

The Coastal Sand dune habitat present within the scheme will be subject to temporary disturbance as part of the proposed works however the habitat will be reinstated and enhanced after the works are complete. Whilst the coastal dune habitat will be enhanced as part of the scheme, due to the location of the dunes and the nature of the site this enhancement will not result in a change in condition. Therefore, the coastal dune habitat will remain at Poor condition.

The habitat described as maritime present at the north of the scheme will also be subject to temporary disturbance as part of the proposed works however the habitat will be reinstated and enhanced to moderate condition after the works are complete.

4.1.3 Porth Killier

At Porth Killier all habitats present, including Supralittoral Rock and Moderate Energy Littoral Rock will be permanently lost as part of the proposed works. This amounts to a total area of 0.9 ha that will be replaced by Rock Armour.

Artificial ‘reef’ rock pools will be placed in the revetment at Porth Killier, this will create niches and ecological opportunities for colonisation by intertidal species.

Enhancements will include;

- Placing textured boulders within the rock revetment in the intertidal zone, creating indentations and artificial rock pools that create niches and ecological opportunities for colonisation by intertidal species.
- Textured formwork for concrete surfaces;
- Adding water retaining features to vertical walls;

Water retaining features should be considered carefully and the placement supervised by an ecologist. If they are placed in areas that are not inundated by the tide for long periods each day, there is the potential to create pockets of hypersaline standing water. The most useful place to create rockpools could be in rocks placed at the toe of the revetment, the rockpools can be retrofitted with pools, striations and cores. This will favour the colonisation of seaweeds associated with the mid and upper littoral zone (ie. Spiral wrack and Channel Wrack already colonising bay).

4.2 BNG Metric

The table below shows the change in biodiversity for each habitat feature. The headline results are also presented, showing overall BNG.

Table 4-1. BNG Metric Detailed Results

Baseline					Post-Intervention				
Metric Ref.	Habitat	Area (Ha)	Condition	Units	Action	Habitat	Area (Ha)	Condition	Units
Porth Coose									
1	Coastal Sand Dunes	0.063	Poor	0.43	Retain	Coastal Sand Dunes	0.048	Poor	0.43
2	Maritime Cliff and Slopes	0.041	Poor	0.28	Retain	Maritime Cliff and Slopes	0.041	Poor	0.28
3	Introduced Shrub	0.006	n/a	0.01	Enhance	Coastal Sand Dunes	0.006	Poor	0.03
4	Built Linear Feature	0.025	n/a	0	Retain	Built Linear Feature	0.025	n/a	0
Periglis Beach									
Metric Ref.	Habitat	Area (Ha)	Condition	Units	Action	Habitat	Area (Ha)	Condition	Units
5	Coastal Sand Dunes	0.220	Poor	1.52	Retain	Coastal Sand Dunes	0.220	Poor	1.52

6	Maritime Cliff and Slopes	0.055	Poor	0.38	Enhance	Maritime Cliff and Slopes	0.055	Moderate	0.57
7	Bare Ground	0.013	Poor	0.03	Enhance	Coastal Sand Dunes	0.013	Poor	0.06
8	Built Linear Feature	0.004	n/a	0	Enhance	Maritime Cliff and Slopes	0.004	Moderate	0.02

4.3 Headline Results for Proposed Scheme

The on-site net change for the combined area of each scheme is outlined below in Table 4-2. Due to the Biodiversity Metric 4.0 not accounting for the intertidal habitats present at Porth Killier these habitats have not been included in the baseline for the proposed scheme but have been listed in the Irreplaceable Habitats tab within the metric and ecological enhancements to the rock armour will be carried out as detailed in Section 4.1.3.

Table 4-2. On-Site Total Net Change

On-site baseline	*Habitat units*	2.66	
	Hedgerow units	0.00	
	Watercourse units	0.00	
On-site post-intervention (Including habitat retention, creation & enhancement)	*Habitat units*	2.92	
	Hedgerow units	0.00	
	Watercourse units	0.00	
On-site net change (units & percentage)	*Habitat units*	0.26	9.72%
	Hedgerow units	0.00	0.00%
	Watercourse units	0.00	0.00%

5 Off-Site BNG Compensation

An area outside of the scheme boundary has been identified as an appropriate site for Off-Site BNG Compensation. The site sits outside of the SSSI designations linked to the proposed scheme. The location of this proposed site is outlined below in Figure 5-1.

Figure 5-1. Location of proposed off-site BNG compensation

5.1 Off-Site Baseline Habitats

The Baseline Habitats recorded at the Off-Site location are described below. The total area of each habitat and its condition are outlined in Table 5-1.

Table 5-1. Off-Site Baseline Habitats

Habitat Type	Habitat Area (Ha)	Condition	Habitat Units
Bare Ground	0.147	Poor	0.34
Other Neutral Grassland	0.211	Poor	0.97
Total Area	0.358	Total Units	1.31

5.2 Off-Site Habitat Enhancement

The proposed off-site enhancements comprise of enhancing the condition of the Other Neutral Grassland habitat present from Poor to Moderate condition as well as enhancing the Bare Ground to Other Neutral Grassland of Moderate condition. The detailed results from the Metric are outline in Table 5-2 below.

Table 5-2. Off-Site BNG Metric Detailed Results

Baseline					Post-Intervention				
Metric Ref.	Habitat	Area (Ha)	Condition	Units	Action	Habitat	Area (Ha)	Condition	Units
1	Other Neutral Grassland	0.211	Poor	0.43	Enhance	Other Neutral Grassland	0.211	Moderate	1.65
2	Bare Ground	0.147	Poor	0.28	Enhance	Other Neutral Grassland	0.147	Moderate	1.05
Total Area		**0.358**	**Total Units**	**0.71**	**Total Area**		**0.358**	**Total Units**	**2.70**

5.3 Headline Results for Off-Site Compensation

The Off-Site net change for the proposed Off-Site compensation area is outlined below in Table 5-3.

Table 5-3. Off-Site Total Net Change

Off-site baseline	*Habitat units*	1.31	
	Hedgerow units	0.00	
	Watercourse units	0.00	
Off-site post-intervention (Including habitat retention, creation & enhancement)	*Habitat units*	2.70	
	Hedgerow units	0.00	
	Watercourse units	0.00	
Off-site net change (units & percentage)	*Habitat units*	1.39	106.21%
	Hedgerow units	0.00	0.00%
	Watercourse units	0.00	0.00%

6 Summary

6.1 BNG Metric Results

The BNG metric headline results are outlined below in Table 6-1.

Table 6-1. BNG Metric Headline Results

On-site baseline	*Habitat units*	2.66	
	Hedgerow units	0.00	
	Watercourse units	0.00	
On-site post-intervention (Including habitat retention, creation & enhancement)	*Habitat units*	2.92	
	Hedgerow units	0.00	
	Watercourse units	0.00	
On-site net change (units & percentage)	*Habitat units*	0.26	9.72%
	Hedgerow units	0.00	0.00%
	Watercourse units	0.00	0.00%
Off-site baseline	*Habitat units*	1.31	
	Hedgerow units	0.00	
	Watercourse units	0.00	
Off-site post-intervention (Including habitat retention, creation & enhancement)	*Habitat units*	2.70	
	Hedgerow units	0.00	
	Watercourse units	0.00	
Off-site net change (units & percentage)	*Habitat units*	1.39	106.21%
	Hedgerow units	0.00	0.00%
	Watercourse units	0.00	0.00%
FINAL RESULTS			
Total net unit change (Including all on-site & off-site habitat retention, creation & enhancement)	*Habitat units*	1.65	
	Hedgerow units	0.00	
	Watercourse units	0.00	
Total net % change (Including all on-site & off-site habitat retention, creation & enhancement)	*Habitat units*	62.00%	
	Hedgerow units	0.00%	
	Watercourse units	0.00%	
Trading rules satisfied?	Yes ✓		

The BNG Metric results outline that as a result of the proposed works and proposed habitat enhancement there stands to be an On-Site 9.72% net gain for biodiversity. However, given that the scheme sits within the boundary of the Big Pool and Browarth Point Site of Special Scientific Interest, and habitat within a SSSI cannot be used to contribute to Biodiversity Net Gain this must be disregarded from the final biodiversity net % change for the scheme.

As such the net change for the scheme will be comprised of the proposed Off-Site compensation. Therefore, the Total Net % Change available to contribute to the scheme Biodiversity Net Gain result is **52.28%.**

Whilst the numbers reflected in the metric appear large with a substantial total net change in biodiversity for the scheme, this is due to the fact that the scheme is relatively small in scale and therefore small changes in habitat condition result in large changes within the metric.

7 Other Proposed Enhancements

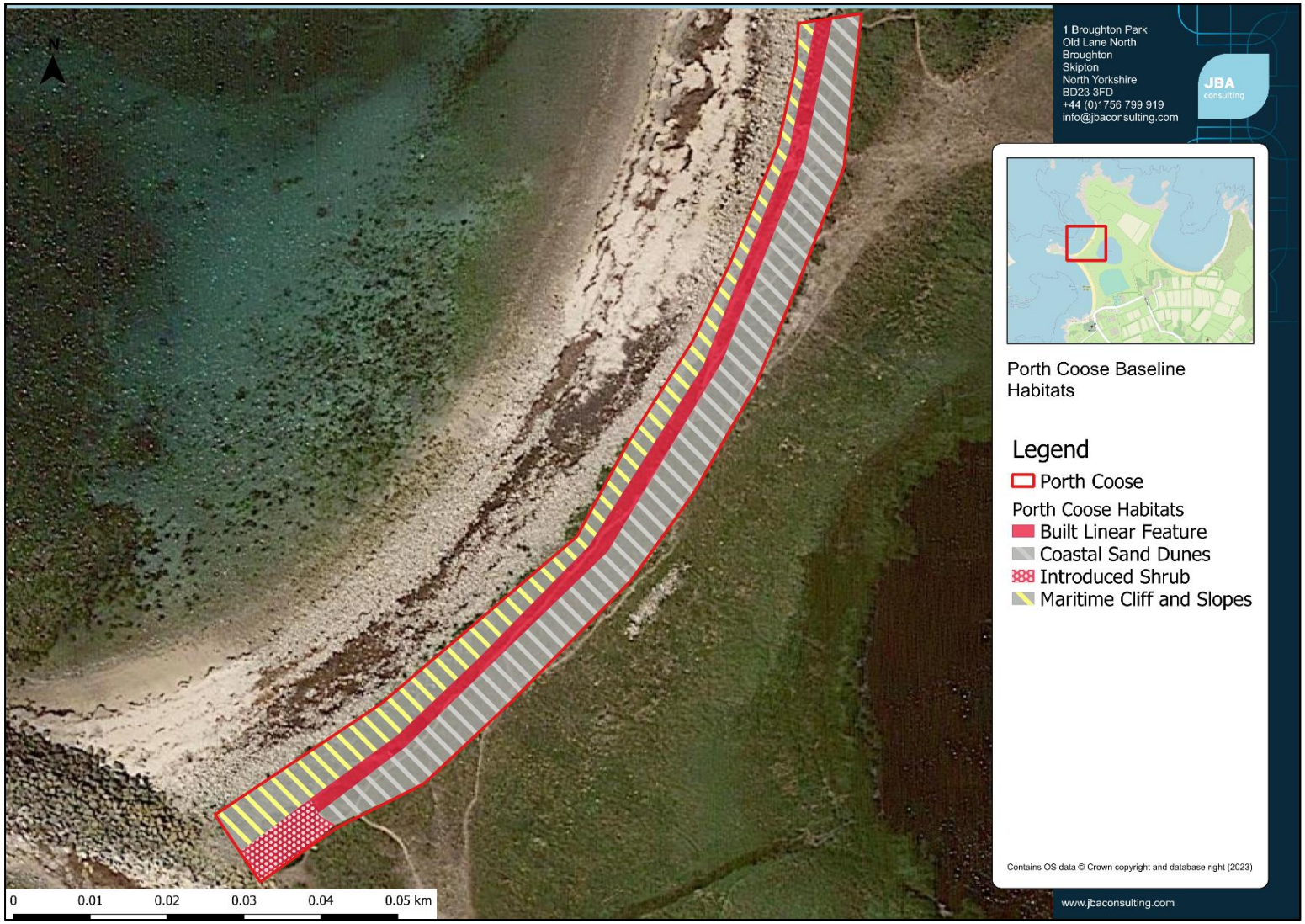
Opportunities for further ecological enhancements have been discussed with the CEO of the Wildlife Trust to ensure that suitable and useful actions are taken. The below measures summarise these recommendations.

7.1 Management of Invasive non-native species (INNS)

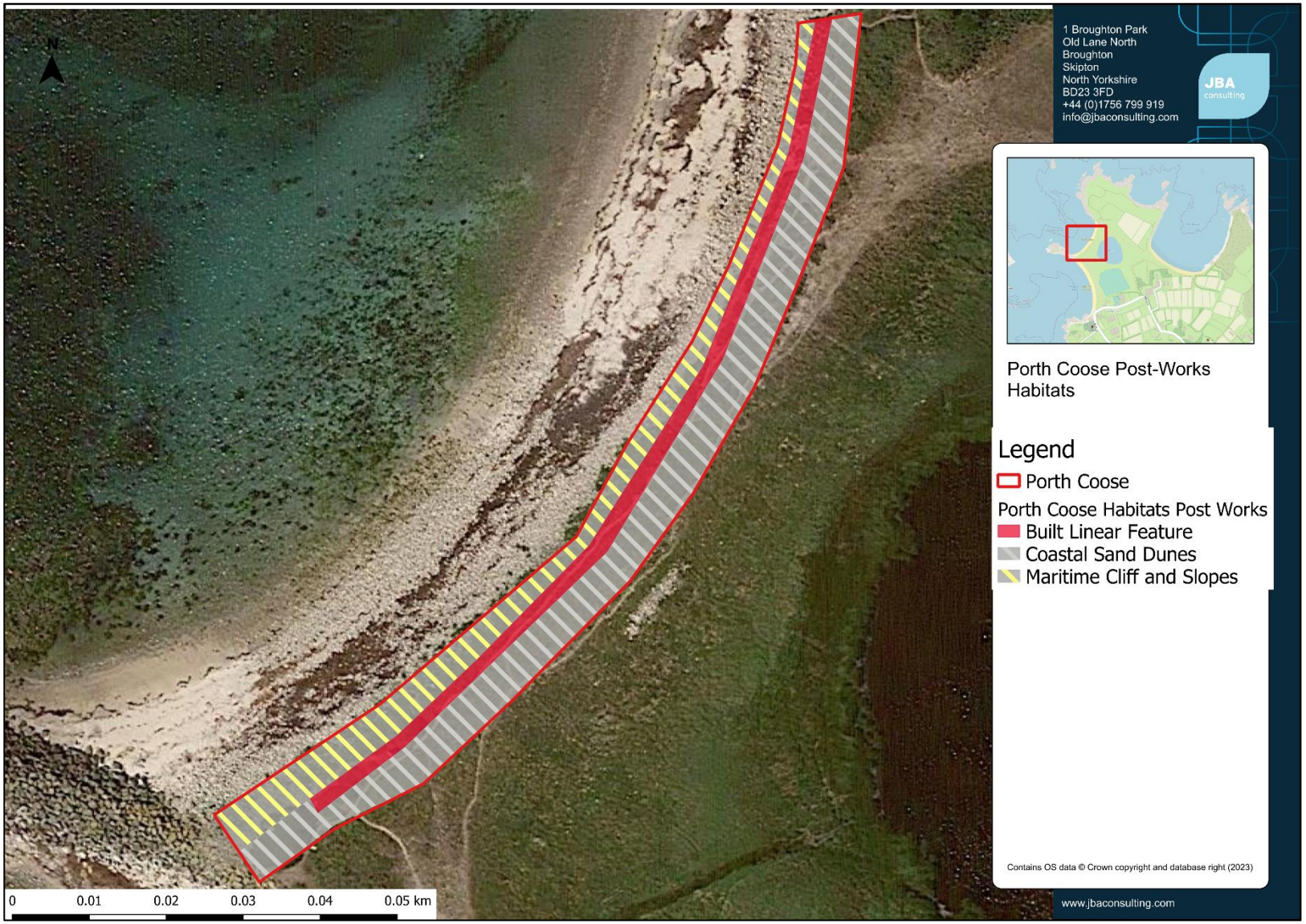
The presence of non-native invasive species (INNS) has been noted throughout all sites of the Isles of Scilly scheme. Increased efforts in the clearing of Hottentot Fig *Carprobotus edulis* would reduce species competition and benefit Dwarf Pansy and Dune flora. In addition, removal/cutting of gorse, bramble and invasive non-native shrubs, creates less species competition allowing the enhancement of native vegetation. Additional enhancements within the works area on St Agnes will be made through the funding of mechanical vegetation clearance to promote heathland and reduce vigour of bracken. Aligning with the 2013 Isles of Scilly Seabird Recovery Project, the removal of the invasive *Pittosporum* could provide greater/increased areas to support breeding Gulls in the Gugh SSSI. This will be managed by the IoS Wildlife Trust.

A BNG Metric Habitat Maps

A.1 Porth Coose Baseline Habitats



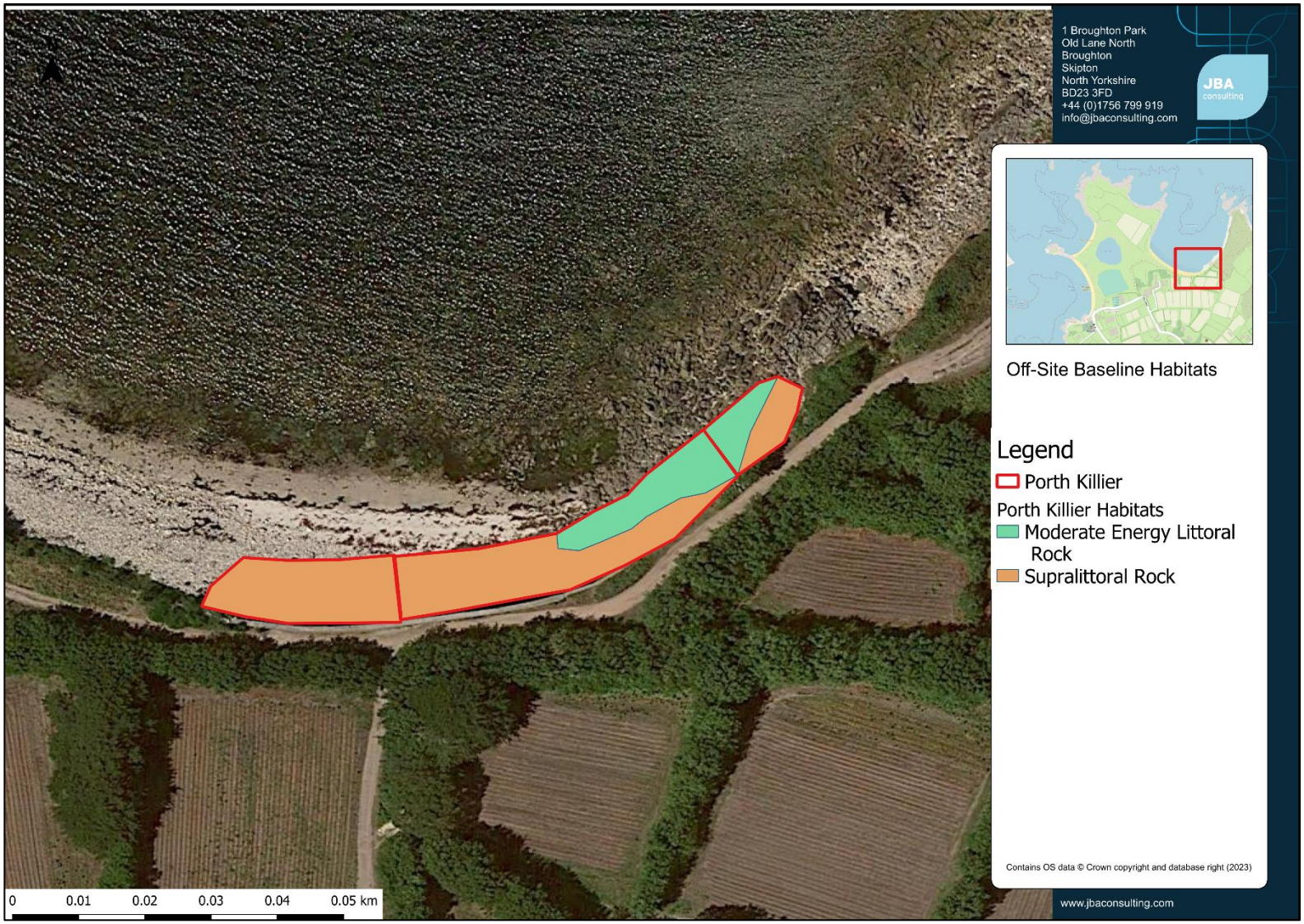
A.2 Porth Coose Post Works Habitats



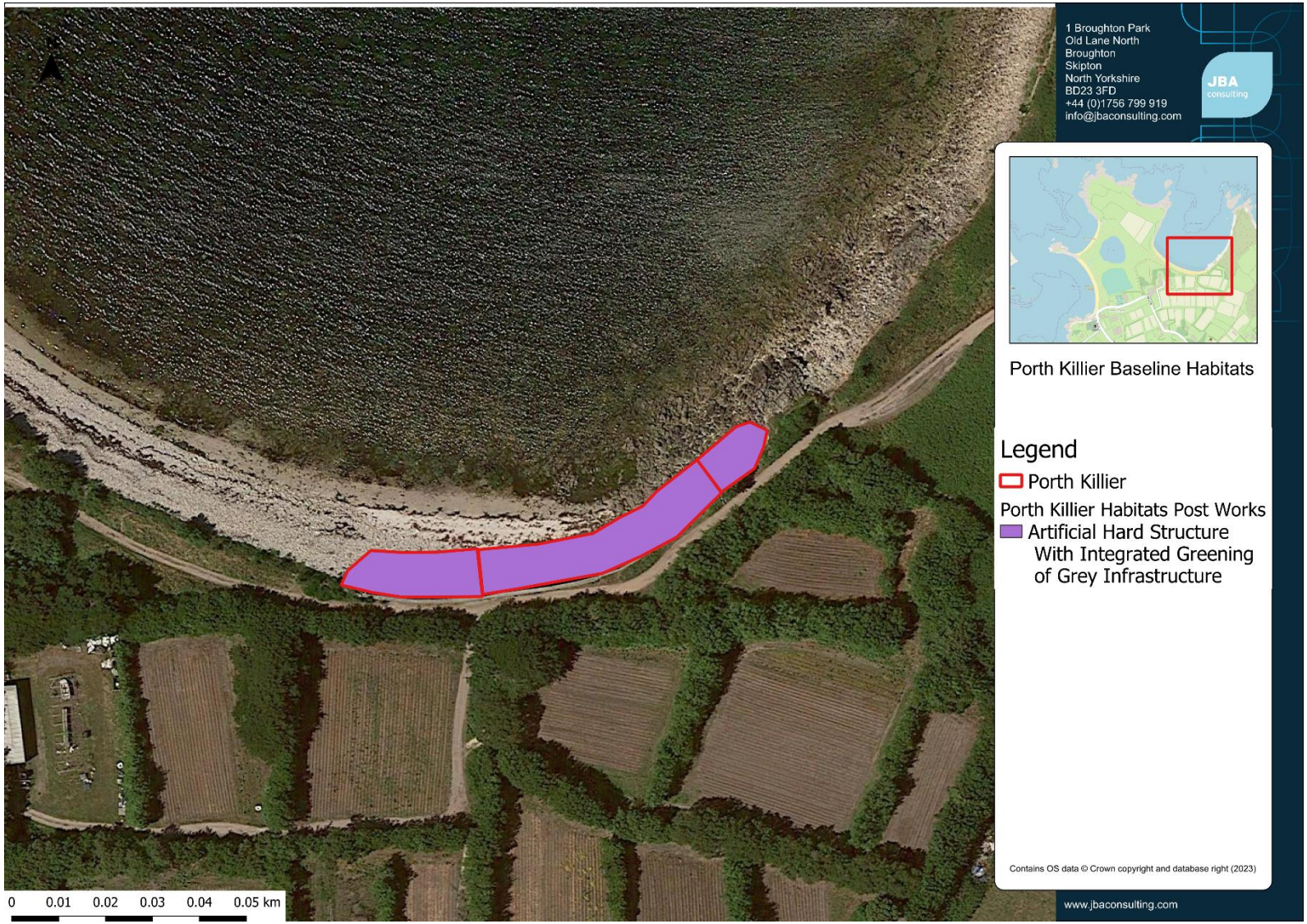
A.3 Periglis Beach Baseline Habitats

A.4 Periglis Beach Post-Works Habitats

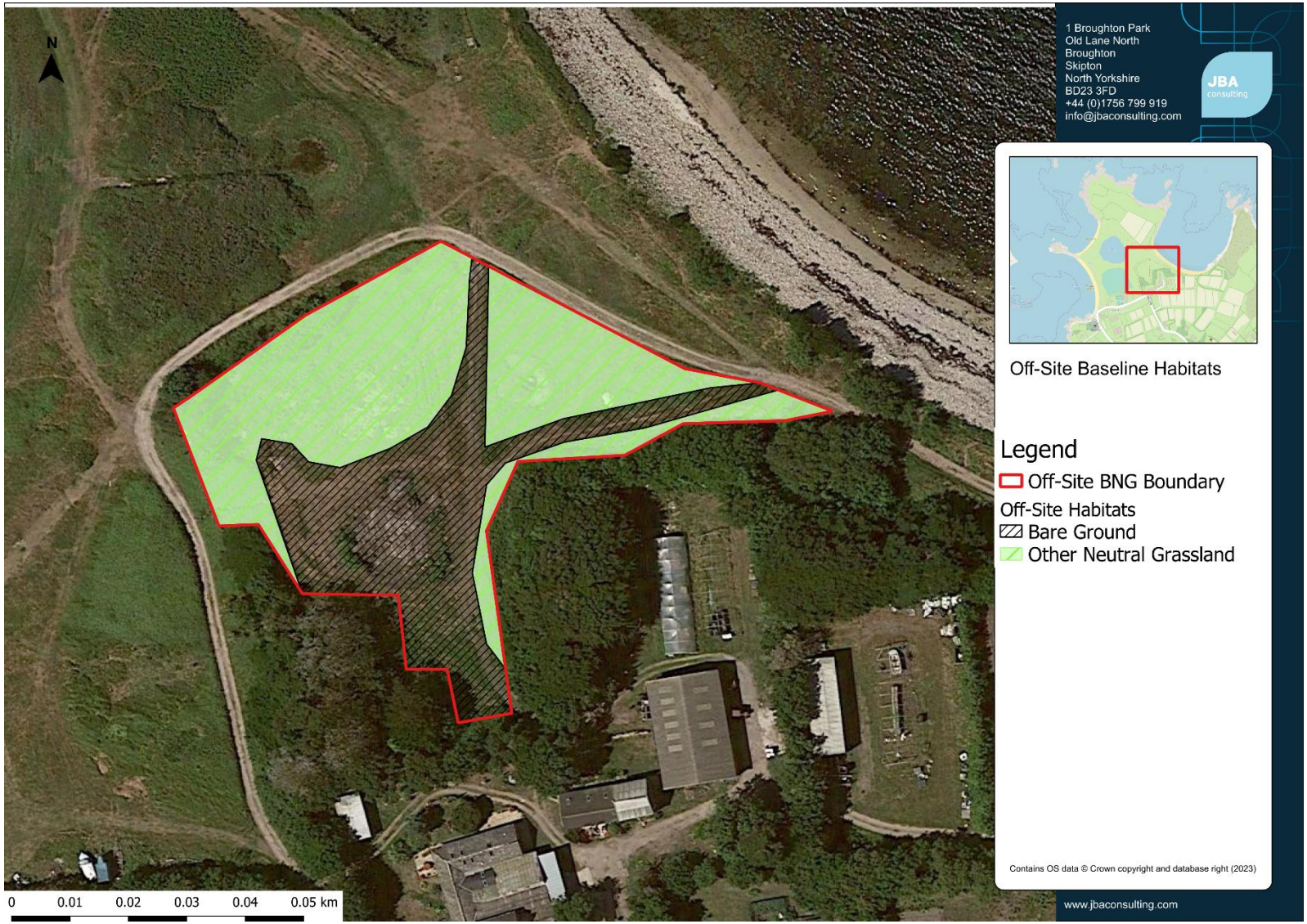
A.5 Porth Killier Baseline Habitats



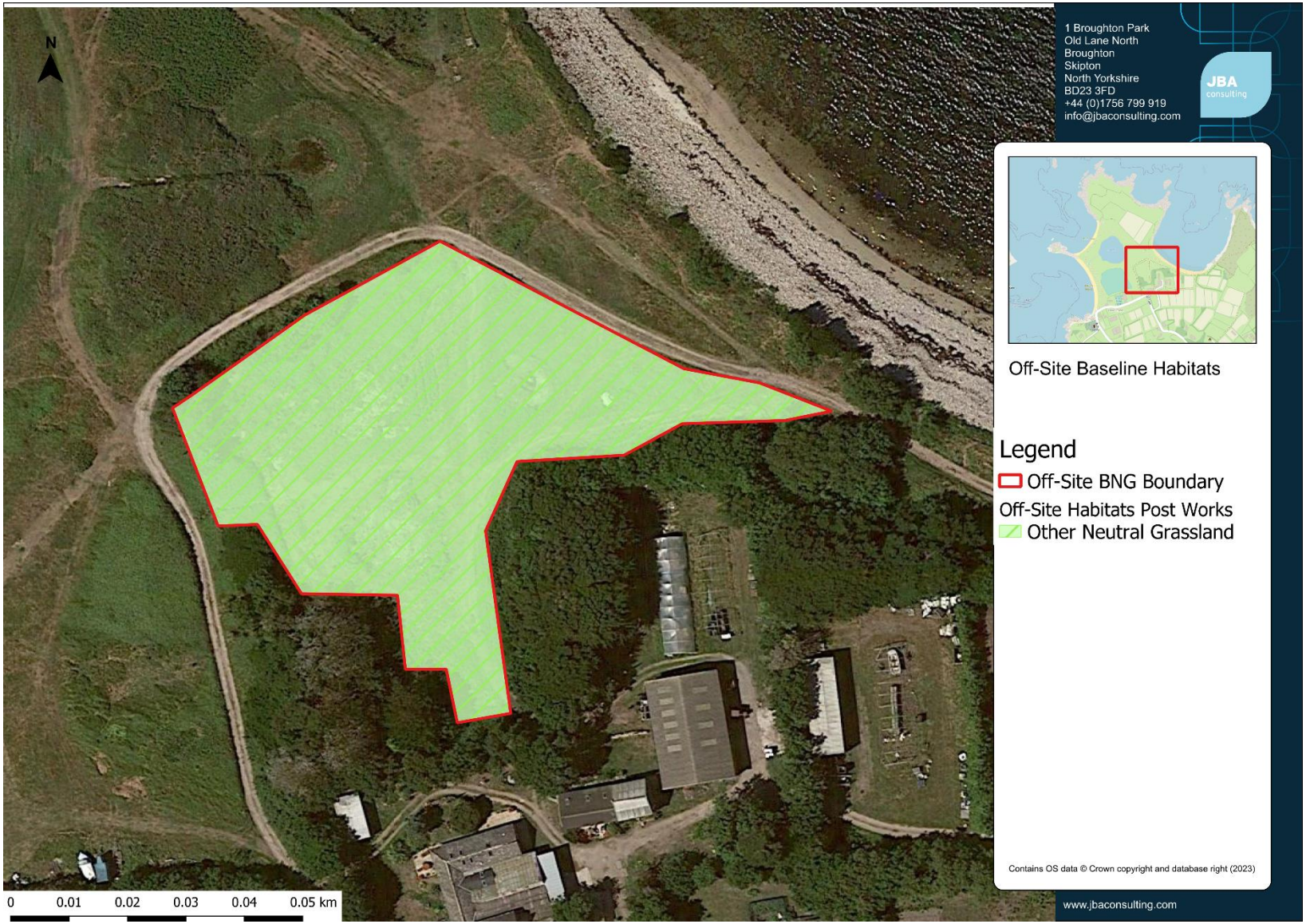
A.6 Porth Killier Post-Works Habitats

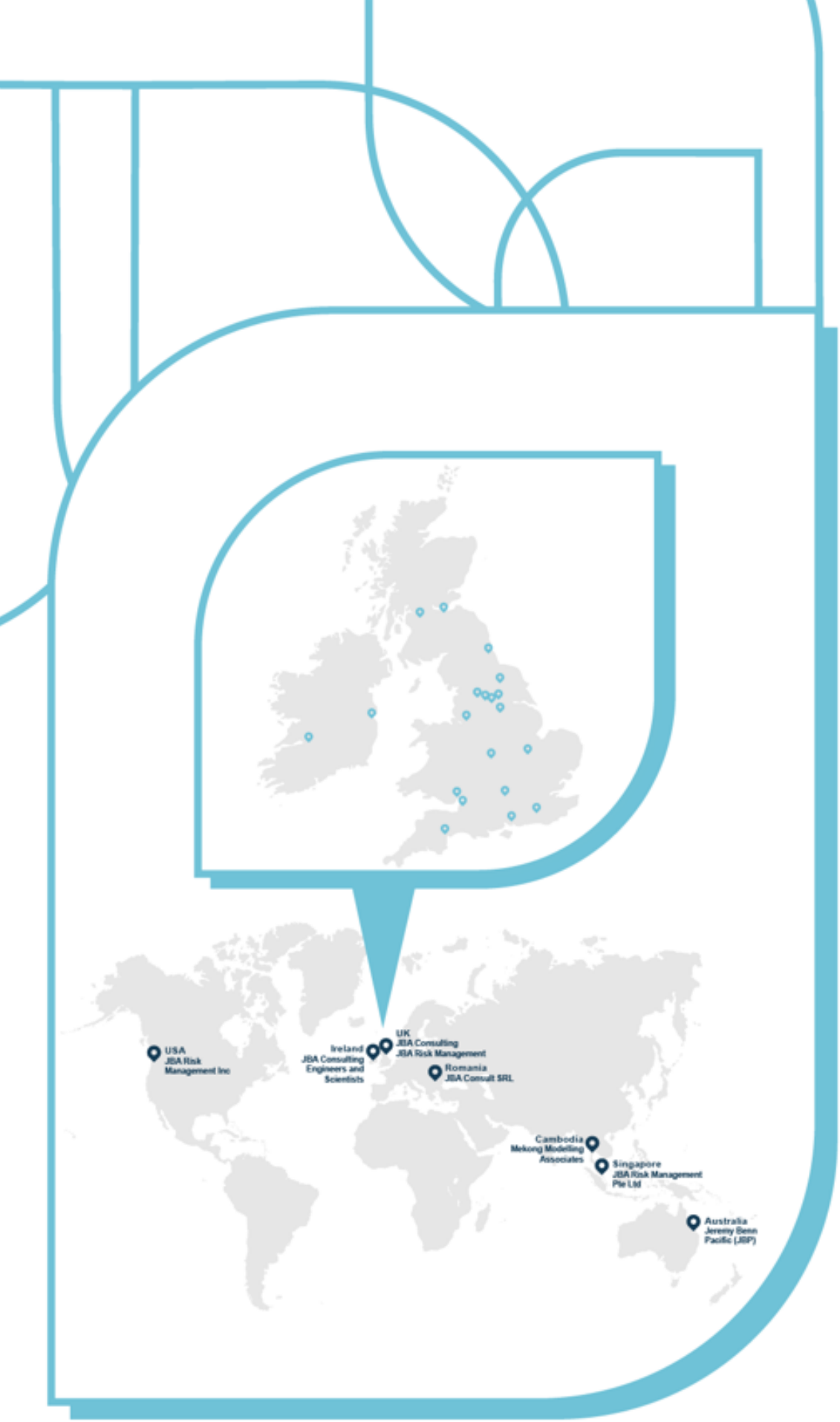


A.7 Off-Site Baseline Habitats



A.8 Off-Site Post-Works Habitats





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